REMARKS

Claims 1-12 are pending in this application. Claims 1, 2, 5-7, and 10-12 stand rejected. Claims 3-4 and 8-9 stand objected to. Claims 1-6 and 8-9 were amended. Claims 13-20 were added. Claims 1-20 remain in the application.

Claims 3-4 and 8-9 were objected to as being dependent upon a rejected base claim, but allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 3-4 and 8-9 have been so rewritten.

Claims 1, 2, 5, 6, 7, 10, 11 and 12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Schmidt (US 5, 754,536). The rejection stated:

> 'As per claims 1 and 6, Schmidt teaches a digital signal processing system for determining the interpolation attributes of a digital signal channel, the system comprising: means for extracting a digital signal from the channel (column 6, lines 39-54); and means for using the extracted digital signal to determine whether the digital signal is an interpolated signal channel or a non-interpolated signal channel (column 10, lines 55-64).
>
> 'The Schmidt reference is mainly directed to digital speech processing method and apparatus. Even though, there are differences between processing image signal data and speech signal data, there are also similarities. Main difference is that, the speech signal is made of one dimensional data stream, whereas, image data is mainly represented as two dimensional. However, two dimensional image data can also be processed in one dimensional data stream. Interpolation is widely used in both speech and image processing that the technique of checking whether the data stream is interpolated or not can be used, in not only in speech processing but also in image data processing. Schmidt discloses means for using the extracted digital signal to determine whether the digital signal is an interpolated signal channel or a non-interpolated signal channel (column 10, lines 55-64). It would have been obvious to one of ordinary skill in the art to adapt the technique taught in Schmidt's teaching into the digital image processing for they share many signal processing technique such as interpolation.

Claims 1 and 6, as amended, state:

1. A method of analyzing a channel of a digital image comprising the steps of:

extracting a signal from the digital image channel; and

using the extracted signal to determine whether the digital image channel is an interpolated digital image channel or a non-interpolated digital image channel.

6. An image processing system for determining the interpolation attributes of a channel of a digital image, said system comprising:

means for extracting a signal from the digital image channel; and

means for using the extracted signal to determine whether the digital image channel is an interpolated digital image channel or a non-interpolated digital image channel.

The language of Claims 1 and 6 is supported by the application as filed, notably, the original claims. Claim 1 was amended to eliminate some unneeded language. Claim 6 was amended to correct grammar.

Claims 1 and 6 relate to a digital image channel. The digital signal channel of Schmidt is not the same as the digital image channel of the application. Schmidt is directed to FDMA/TDMA communications systems. (Schmidt, col. 1, lines 5-9; also see col. 1, line 13 to col. 3, line 48) Schmidt states:

"Speech interpolation (SI) is a technique whereby trunk channels are assigned and withdrawn on the basis of active speech existing on an incoming link. SI is trypically used on relatively expensive or spectrum-limited paths to increase the effective capacity of a trunk. At the transmitter, a speech detector is used to discriminate between speech portions ("talkspurts") and silent intervals ("pauses"). Because the average percentage of talkspurt to total call duration is about 45%, effective trunk capacity is increased by approximately a factor of two when only the talkspurt is transmitted." (Schmidt, col. 1, lines 13-22)

This description fits a definition of "channel" applicable to telecommunications:

"channel

1) In telecommunications in general, a channel is a separate path through which signals can flow." (The whatis?com Encyclopedia of Technology Terms, Pearson Technology, Indianapolis, Indiana, (200), p.118)

Claims 1 and 6 are in the subject area of electronic imaging. The following is a definition of "channel" applicable to electronic imaging:

"CHANNEL In electronic imaging, the holding of color information in a separate location. Each component of the color data, RGB, is held in a separate channel. In color separation, four channels are used to hold the CMYK data. Channels can be likened to separation negatives or to printing plates." (The Focal Encyclopedia of Photography, 3rd ed., L. Stroebel and R. Zakia editors, Focal Press, Boston, (1993), page 94)

The application is directed to an electronic imaging definition:

"a digital image may be considered as comprising a certain number of digital image channels. In the case of a digital image comprising red, green and blue two-dimensional arrays, the image comprises three channels, namely, red, green and blue channels. Additionally, a luminance channel *p* may be formed from the color channels." (page 4, lines 11-15)

Claims 1 and 6 both use the terms "interpolated" and "non-interpolated" as follows:

"using the extracted signal to determine whether the digital image channel is an interpolated digital image channel or a non-interpolated digital image channel."

This use of "interpolated" is different than the "speech interpolation" of Schmidt, which describes speech interpolation with a speech detector that 'is used to discriminate between speech portions ("talkspurts") and silent intervals ("pauses").' (See above quote from Schmidt) Schmidt, more specifically, refers to digital speech interpolation or "DSI". (Schmidt, col. 6, lines 51-52; col. 10, lines 56-59)) Yatsuzuka, which is cited in Schmidt, describes DSI:

"For the purpose of economization by efficiently utilizing a transmission line having a limited communication capacity, a digital speech interpolation system called DSI system is employed in this digital speech transmission system." (Yatsuzuka, col. 1, lines 24-28)

"In case of transmitting a plurality of digital speech signal, the DSI system transmits, by detecting sound portions of speech signals in each input

trunk, and by combining only said detected sound portion to form new digital signals, the new digital signals through a smaller number of output channels than the number of the input trunks." (Yatsuzuka, col. 1, lines 30-37)

This contrasts the interpolation of the application, which states:

"In the field of image processing, it is often the case that an image must be resized for a desired application. For example, the pixels per inch (or dpi dots per inch) of many display devices are fixed. A particular printer may have a resolution of 250 dpi, for example. In order to print an image consisting of 500 by 750 pixels to a 4 by 6 inch print on such a printer, the image must be resized by a factor of 2. In other words, the values of the image at locations between the original samples must be determined. This process of determining the value of an image signal at locations which are not coincident with the original samples of the image is called interpolation." (page 1, lines 9-17; emphasis added)

A resized image is not a "silent interval".

In addition to the channel and interpolation being different than Claims 1 and 6, the rejection also relies upon an assumption that Schmidt's digital signal processing system for determining the speech interpolation attributes of a digital speech signal channel is applicable to image signals. The rejection states:

"Even though, there are differences between processing image signal data and speech signal data, there are also similarities. Main difference is that, the speech signal is made of one dimensional data stream, whereas, image data is mainly represented as two dimensional. However, two dimensional image data can also be processed in one dimensional data stream. Interpolation is widely used in both speech and image processing that the technique of checking whether the data stream is interpolated or not can be used, in not only in speech processing but also in image data processing. Schmidt discloses means for using the extracted digital signal to determine whether the digital signal is an interpolated signal channel or a non-interpolated signal channel (column 10, lines 55-64). It would have been obvious to one of ordinary skill in the art to adapt the technique taught in Schmidt's teaching into the digital image processing for they share many signal processing technique such as interpolation."

This assumption is not supported. A contrary position, in relation to a speech interpolation system, is taken in U.S. Patent No. 3,647,949 to Closs et al, entitled, "VIDEO MULTIPLEXING SYSTEM" (hereafter "Closs"). Closs describes a particular speech interpolation system, in which signals are multiplexed and "silent intervals" in subscriber speech are not transmitted. Closs then states:

> "In the transmission of video signals, where each single signal contains essential information content and where a new connection may be needed for each picture element, such a system operated by a central control cannot be employed." (Closs, col. 1, lines 53-57)

Closs would not motivate one of skill in the art to assume that Schmidt's digital signal processing system for determining the speech interpolation attributes of a digital speech signal channel is applicable to image signals.

Claims 2, 5, and 13-15 and Claims 7 and 10-12 are allowable as depending from Claims 1 and 6, respectively and as follows.

The rejection stated in relation to Claims 2 and 7:

> "As per claims 2 and 7, determining an estimated factor of interpolation is a mere reverse interpolation. Given the Schmidt reference, which determines whether the digital signal is an interpolated signal channel or a non-interpolated signal channel, at the time the invention was made, it would have been inherent, if not obvious to one of ordinary skill in the art to determine an estimated factor that resulted in the interpolated signal."

Claims 2 and 7 state:

> 2. The method as claimed in claim 1 wherein said using further includes determining an estimated factor of interpolation.
>
> 7. The image processing system as claimed in claim 6 wherein said means for using the extracted signal further determines an estimated factor of interpolation.

Claim 2 was amended to be in accord with the changes in Claim 1. The rejection is not understood. Schmidt states that a communication unit (mobile or fixed) implements digital speech interpolation and goes on to state:

> "On the receive side, when CU apparatus 108 does not receive an allocated downlink reuse unit, CU apparatus 108 assumes that the remote CU is experiencing a silent interval."

(Schmidt, col. 8, lines 41-42 and (quoting) 49-52) Is the rejection arguing that assuming a silent interval is a reverse interpolation? What would the factor of interpolation be? A ratio of speech portions and silent intervals? The "assuming" by the CU apparatus 108 would appear to be independent of such a ratio. In any case, the "factor of interpolation" proposed for Schmidt does not meet the language of Claims 2 and 7. The application states:

> "The factor of interpolation, *N*, refers to the ratio of the sampling rate of the output image to the sampling rate of the input image." (page 1, lines 17-18)

This is a ratio between one image and another, not between numbers of speech portions and silent intervals.

The rejection stated in relation to Claims 5 and 10:

> "As per claims 5 and 10, same arguments with regard to claims 2 and 7 apply because the estimated factor would provide information as to which method of interpolation was used to form the digital image channel."

Claims 5 and 10 state:

> 5. The method as claimed in claim 1 wherein said using further includes determining the method of interpolation that was used to form the digital image channel.
>
> 10. The image processing system as claimed in claim 6 wherein said means for using the extracted signal determines the method of interpolation that was used to form the digital image channel.

Claim 5 was amended to be in accord with the changes in Claim 1. Claims 5 and 10 are allowable on the grounds presented in relation to Claims 2 and 7. It would also appear that in Schmidt, the method of interpolation (removal of silent intervals) is necessarily known before the:

> ".. CU apparatus 108 assumes that the remote CU is experiencing a silent interval."

(see above quote, Schmidt, col. 8, lines 49-52)

The rejection stated in relation to Claim 11:

> As per claim 11, Schmidt teaches determining whether the digital image channel is an interpolated digital image channel or a non-interpolated digital image channel (column 10, lines 55-64). Schmidt does

not teach details on sending a message to a user based on this finding. Schmidt clearly performs different functions based on this finding. Mere incorporation of sending a message to a user at this point is not deemed patentably significant and lacks any criticality.

Claim 11 states:

> 11. The image processing system as claimed in claim 6 further including means for sending a message to a user based on determining whether the digital image channel is an interpolated digital image channel or a non-interpolated digital image channel.

In Schmidt, the user knows whether speech or silence is being sent. What would motive one of skill in the art to send a message that the speech being heard by the user is speech or that the silence is an assumed silent interval?

The rejection stated in relation to Claim 12:

> As per claim 12, Schmidt teaches means for determining a subsequent image processing channel based on whether the digital image channel is an interpolated digital image channel or a non-interpolated digital image channel (column 10, lines 55-64).

Claim 12 states:

> 12. The image processing system as claimed in claim 6 further including means for determining a subsequent image processing path based on whether the digital image channel is an interpolated digital image channel or a non-interpolated digital image channel.

Claim 12 is supported by the application as filed, notably at page 10, lines 9-11. Claim 12 has been amended to match the terminology used in the specification.

Added Claims 13-14 state:

> 13. The method as claimed in claim 1 wherein said extracting a signal comprises extracting a signal related to differences between the values of neighboring pixels of the digital image channel.
>
> 14. The method as claimed in claim 1 wherein said using the extracted signal comprises determining the periodicity of the extracted signal by computing a Fourier Transform signal of the extracted signal and looking for peaks in the Fourier Transform signal.

Added Claims 13-14 are supported by the application as filed, notably Claims 3-4, and are likewise allowable.

Claim 15 states:

15. The method of claim 1 wherein said using further comprises determining an interpolation procedure associated with said channel, when said channel is an interpolated digital image channel.

Claim 15 is supported by the application as filed, notably Claim 10 and is allowable on the same grounds.

Claim 16 states:

16. A digital image analysis method comprising the steps of:

extracting a signal from a channel of a digital image; and

using the extracted signal to determine whether the channel is interpolated or non-interpolated.

Added Claim 16 is supported by the application as filed, notably Claim 1, and is allowable on the same basis.

Claims 17-20 are allowable as pending from Claim 16 and as follows.

Claim 17 states:

17. The method as claimed in claim 16 wherein said using further includes determining an estimated factor of interpolation.

Added Claim 17 is supported by the application as filed, notably Claim 2, and is allowable on the same basis.

Claim 18 states:

18. The method as claimed in claim 16 wherein said digital image has three channels.

Added Claim 18 is supported by the application as filed, notably at page 4, lines 11-14.

Claim 19 states:

19. The method as claimed in claim 18 wherein said digital image has red, green, and blue channels.

Added Claim 19 is supported on the same basis as Claim 18.

Claim 20 states:

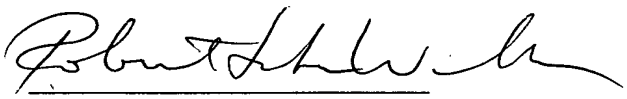
20. The method as claimed in claim 16 wherein said using further comprises determining whether said channel contains a periodicity corresponding to an interpolation factor.

Added Claim 20 is supported by the application as filed, notably page 4, line 29 to page 5, line 3. The periodicity contrasts with the assumed silences of Schmidt. (See above discussion of interpolation factor.)

It is believed that these changes now make the claims clear and definite and, if there are any problems with these changes, Applicants' attorney would appreciate a telephone call.

In view of the foregoing, it is believed none of the references, taken singly or in combination, disclose the claimed invention. Accordingly, this application is believed to be in condition for allowance, the notice of which is respectfully requested.

Respectfully submitted,



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Enclosures: Copies of References